thereof; "a" is 1 to 2; "b" is 1; "x" is about 0.01 to about 1.0; and "y" is a value from about 2 to about 4 that provides the oxide complex with zero electrical resistance at a temperature of 40°K or above;

compacting the mixture into a solid mass by application of pressure from about 100 to about 30,000 psi;

heating the solid mass in air to a temperature of from about 800 to about 1000°C for a time sufficient to react the compacted mixture in the solid state; and

C 15 cont.

quenching the solid mass to ambient temperature in air.

REMARKS

In accordance with the Examiner's suggestion (paragraph 14 of the January 20, 1988 Office Action), Applicant has added the claim there set forth as new Claim 94 for the purpose of an interference. Pursuant to 37 C.F.R. 1.605(b), as noted in paragraph 15 of the Office Action, the issues raised by paragraphs 1, 2, 4, 5, 6, 8, 9, 11, 12 and 16 of the Office Action are not addressed at this time. That Applicant is not at this time responding to such issues should not be construed as indicating that Applicant waives the right to respond thereto by argument, amendment or other evidence at an appropriate time. It is assumed that when a time for response to the unaddressed issues becomes appropriate that the Examiner will set a time for response so that Applicant may submit evidence, arguments and/or further claim amendments addressed to such issues before any final rejection is entered. See paragraph 19 of the Office Action.

The Examiner's suggestion in paragraph 3 for claim language that would remove a rejection under 35 U.S.C. § 112 has been adopted. Claims 16, 20, 24, 26, 29, 35, 47, 56, 61, 63, 65, 66, 78, 82, and 88 have all been amended to incorporate claim language in accordance with that suggestion. Claim 65 has also been amended to correct a misspelling as noted in paragraph 7 of the Office Action.

Further, in accordance with 37 C.F.R. 1.605(a), new claim 93 is also presented at this time in the belief that it is more appropriate to be included in any interference which may be declared.

Claim 93 differs from the claim suggested by the Examiner (claim 94) in that claim 93 is not restricted to a single phase composition but instead covers a material which contains a sufficient quantity of such a phase composition to cause the material to exhibit zero resistance at a temperature of 77°K or higher. Claim 93 also recites the minimum temperature for zero electrical resistance as 77°K rather than 70°K.

In the face of the Examiner's statement of a type of composition claim (now claim 94) that is allowable and suggested for purposes of interference, coupled with the absence of an art rejection or § 112 rejection of claims 57-65, it is assumed that such claims (as now amended in the manner suggested at paragraph 3 to remove the § 112 objection), are allowable but for the fact that they are considered to not be separately patentable (i.e. - not separate and distinct) over the claim suggested by the Examiner.

It is believed that production of an yttrium oxide complex with a nominal composition of $Y_{1.2}Ba_{0.8}CuO_y$ (Y=2 to 4) prepared as disclosed by Example XI of Applicant's Serial No. 12,205 filed February 6, 1987 and Serial No. 32,041 filed March 26, 1987, which was a multiple phase material that exhibited zero electrical resistance at 80°K and 90°K, was the first making of a material that superconducted at or above the temperature of 77°K. Analysis of that mixed phase yttrium oxide complex material performed subsequently to the filing of Applicant's Serial No. 12,205 -- by Applicant as well as by other workers who learned of such high temperature superconducting mixed phase material from Applicant's reports thereof -- identified the crystalline phase composition therein responsible for such high temperature superconductivity to be $YBa_2Cu_3O_{6+\partial}$.

It appears from the state of the reports submitted to Physical Review Letters and other journals that other workers in this field reproduced and analyzed Applicant's mixed phase matieral. For instance, Applicant's manuscript describing the production and observation of a high temperature superconducting multi phase composition of nominal formula $Y_{1.2}B_{0.8}CuO_y$ was submitted on February 6, 1987 to Phys. Rev. Lett. and was published therein on or about March 2, 1987; Phys. Rev. Lett., Vol. 58, No. 9, pp. 908-910. Shortly after publication of Applicant's report on the mixed phase material, a paper by R.J. Cava et al, "Bulk Superconductivity at 91K in Single Phase Oxygen-Deficient Perovskite $Ba_1YCu_3O_{9-\partial}$" was submitted on March 5, 1987 to Phys. Rev. Lett. Similarly, a paper by

P.M. Grant et al, "Superconductivity Above 90K In the Compound $YBa_2Cu_3O_x$: Structural, Transport and Magnetic Properties" was submitted on March 10, 1987 to Physical Review B, Rapid Communications.

The paper by the Cava et al group clearly identified the starting point for the work therein reported to be the work by Applicant:

> Recent reports of superconductivity at temperatures of 90 - 90K in the Y-Ba-Cu-O chemical system have dramatically demonstrated that T_c's higher than those generally considered attainable can be achieved[6] in oxide systems. The very high T_c's in the Y-Ba-Cu-O system were obtained in polycrystalline material with optimal formulation $Y_{1.2}Ba_{0.8}CuO_{4-y}$, which was actually a mixture of several phases(6). It was suggested that superconductivity might even arise from interfacial interactions between phases.
>
> In this report we present the results of a study in which we have identified and prepared as a pure phase the superconducting compound in this chemical system, and examined its properties employing single-phase polycrystalline samples.
>
> * * *
>
> In summary, we have identified the superconducting compound in the Y-Ba-Cu-O chemical system....."
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> * * *
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> 6. M.K. Wu, J.R. Ashburn, C.J. Torng, P.H. Horn, R.L. Meng, L. Gao, Z.J. Huang, Y.Q. Wang and C.W. Chu, Phys. Rev. Lett., 58, 908 (1987), and C.W. Chu, P.H. Hor, R.L. Meng, L. Gao, Z.J. Huang, Y.Q. Wang, J. Bechtold, D. Campbell, M.K. Wu, J. Ashburn and C.Y. Huang, (preprint).

* * *

[Upon completion of this work, we received a preprint from J.M. Tarascon, L.H. Greene, W.R. McKinnon, and G.W. Hull, confirming the results of Reference 6 in a mixture of phases in the Ba-Y-Cu-O system.]

The publication by the Grant group likewise clearly identifies the starting point for their work to be Applicant's work:

> After many years of intense search for superconductors with transition temperatures significantly higher than 20K, a literal explosion of success has occurred in past months. Beginning with the discovery by Bednorz and Muller[1] of a 30K transition in $La_{2-x}Ba_xCuO_{4-y}$, a rapid series of advances has occurred, culminating in recent reports by Wu, et al.[2], Chu, et al.[3], Tarascon, et al.[4] and Zhao, et al.[5] of an onset temperature greater than 90K in multi-phase material produced from various mixtures of Y, Ba, and Cu compounds subsequently oxidized in high temperature.

* * *

> Preliminary analysis by the Chu group[6] indicates that the green phase is orthorhombic and the black phase cubic or tetragonal. Moreover, they found that presence of the black phase is necessary for superconductivity, whereas the green phase by itself does not superconduct. Consequently, we focussed on identifying the major phase in the black material.

* * *

In summary, we have determined the superconducting phase present in the YBaCuO quaternary system and measured its transport and magnetic properties....

* * *

We are indebted to R.L. Greene for many stimulating discussions and a critical reading of the manuscript. We have also benefited from conversations with C.W. Chu, D.J. Scalapino, T.H. Geballe, A.P. Malozemoff, J.G. Bednorz, M. Shafer, P.W. Anderson and many colleagues at the IBM Almaden Research Center.

* * *

2. M.K. Wu, J.R. Ashburn, C.J. Torn, P.H. Hor, R.L. Meng, L. Gao, Z.J. Huant, Y.Q. Wang and C.W. Chu, Phys. Rev. Lett. xx, xxx (1987).

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3. C.W. Chu, P.H. Hor, R.L. Meng, L. Gao, Z.J. Huang, Y.Q. Wang, M.K. Wu, J.R. Ashburn and C.Y. Huang, Phys. Rev. Lett. xx, xxx (1987).

* * *

6. C.W. Chu, Stanford Physics Seminar, March 3, 1987.

The above is but an example of work performed by other groups to reproduce and identify $YBa_2Cu_3O_{6+\delta}$ based upon their knowledge of Applicant's report of the multiphase material and its high temperature superconducting property.

Claim 93 is more appropriate in any interference which may be declared than one which could be argued to be

limited to a composition of essentially pure $YBa_2Cu_3O_{6+\partial}$ phase.

The claim suggested by the Examiner (now claim 94) for interference purposes could possibly be interpreted too narrowly and henceforth not fairly define the interference subject matter. It is possible that pertinent issues of derivation could not be adequately addressed if claim 94 defines the interference subject matter. In addition, in an interference defined by claim 94 other parties to the interference may raise questions regarding Applicant's right to rely upon the February 6, 1987 filing date of Serial No. 12,205 as support for the suggested claim; whereas, the broader claim 93 makes the support in the earlier application clear.

For the reasons expressed here, as well as others, it is submitted that claim 93 is more appropriate for any interference to be declared.

It is clear that the Y-Ba-Cu-O material of Applicant's Example XI contained a crystalline phase composition exhibiting zero electrical resistance at a temperature of 77°K (or 70°K as in the suggested claim) or above, that such phase had the formula $YBa_2Cu_3O_{6+\partial}$ wherein ∂ has a value from about 0.1 to about 4.5 that provides the phase composition with zero electrical resistance at a temperature of 77°K (or 70°K as in the suggested claim) or above. It is also clear from the Examiner's suggestion that the proposed claim 94 is allowable that a high temperature superconducting material containing a crystalline phase composition having the formula

$LM_2Cu_3O_{6+\partial}$, of which $YBa_2Cu_3O_{6+\partial}$ is a species, is allowable.

It is for this reason that Applicant has added claim 93 for the purposes of any interference to be declared.

An interference count should be broad enough to encompass the broadest corresponding patentable claim of each of the parties. M.P.E.P. § 2309.01. The Examiner's suggested claim to a single phase $LM_2Cu_3O_{6+\partial}$ composition is narrower than Applicant's claims 57-65 which cover a multi phase material containing a $LM_2Cu_3O_{6+\partial}$ phase. Claims 58 and 62 specifically cover a sintered metal oxide complex of the species $LM_2Cu_3O_{6+\partial}$. Since the Examiner has identified these broader claims as unpatentable over the suggested claim 94, they should be included in any interference under claim 93 as the more appropriate claim for any interference to be declared.

As previously noted, no art rejection exists as to Applicant's claims 57-65. This being the case, it is believed that the suggested claim is not the most appropriate for an interference unless the interference is to be set up with overlapping counts. A more appropriate claim for interference is one which is not limited to a "single" phase as set forth in claim 94, the suggested claim.

It is respectfully submitted that claim 93 is more appropriate and should be used as the basis for setting up any interference which may be declared.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8(a)

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on February 16, 1988

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